

## FEATURE

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# The personal inflation calculator

## SUMMARY

This article describes the introduction by the Office for National Statistics of a personal inflation calculator on the National Statistics website. A separate article (O'Donoghue, 2007) established that inflation rates for individuals are likely to vary, because their personal patterns of consumption are unlikely to exactly mirror the 650 items that are priced to calculate the retail prices index (RPI). The personal inflation calculator allows people to gain a better understanding of how price changes affect them and of how inflation estimates are produced by calculating an inflation rate appropriate to their own spending on the main categories of goods and services.

The personal inflation calculator is based on the RPI, the long-standing and familiar domestic measure of inflation, whose uses include indexation of pension payments, state benefits and private contracts. The RPI covers the full range of goods and services bought by the vast majority of households. This includes the essentials, such as food, housing and heating, as well as discretionary purchases, such as audio-visual equipment and holidays. It covers daily purchases, such as newspapers, as well as very infrequent purchases such as cars and washing machines. The RPI measures the changing price, on a month-by-month basis, of a 'representative basket' of about 650 goods and services or 'items' – the exact number varies from year to year. The index is calculated as a weighted average of the price indices for each of these items. The weights are calculated to represent the average expenditure pattern of all UK households, except some pensioner and high-income households. See O'Donoghue, 2007 for more information on expenditure weights.

No two individuals are the same and very few will totally conform to an average profile. Indeed there would be no reason for using averages if we were all uniformly the same. This is just as true of our expenditure patterns as it is about other behavioural characteristics. It means that most people's spending patterns will differ from the average used to compile the RPI weights, in some cases significantly so. In consequence, it is almost certain that personal inflation rates will differ from those calculated using

average spending patterns. This effect can be examined by combining the price changes of components of the RPI in a way which gets closer to an individual's expenditure pattern than the national averages used in the published RPI. The Office for National Statistics (ONS) has made available on the National Statistics website at [www.statistics.gov.uk/cci/nugget.asp?id=22](http://www.statistics.gov.uk/cci/nugget.asp?id=22) a personal inflation calculator which allows users to do this. It is based on the RPI although the principles apply equally to the consumer prices index (CPI).

## How the personal inflation calculator works

It is never possible to replicate exactly an individual's personal inflation rate as this would require detailed knowledge of where they shop, the precise purchases they make and the prices they pay. It is, however, possible to reassemble the price indices used to calculate the RPI to reflect something closer to their personal expenditure patterns. This is the approach adopted for the personal inflation calculator. The expenditure groups in the calculator have been chosen to balance users' ability to make meaningful estimates with the level of detail needed to identify differences in price movements. In most cases, users are asked to estimate monthly expenditure but, for categories where purchases tend to be relatively infrequent, total expenditure in the last year or last three years is requested. These estimates are then scaled so that they can be compared with average monthly expenditure.

The following special calculations are used for housing and motor vehicle expenditure.

## Housing

The RPI includes a range of housing costs. Some, such as the cost of rent, water charges and home insurance, are relatively simple to estimate, but others, in particular mortgage interest payments and depreciation costs, are much more complicated.

The chief difficulty in calculating mortgage interest payments is that the monthly payments made by the two thirds of households that have a mortgage mix these payments together with capital repayments and the administrative costs of the lender. The approach adopted in the RPI is to estimate the average amount of outstanding debt and the average interest rate on that debt and combine them to calculate an estimated payment. Users of the calculator are therefore asked to enter the value of their outstanding mortgage, and the interest rate used in the RPI is applied to this to estimate the importance of mortgage interest payments in their expenditure pattern

The RPI is designed to include the cost of major repairs a homeowner needs to make to maintain their property. As it is difficult to obtain good price series for these directly, they are estimated by using depreciation costs as a proxy indicator. However, the calculation of depreciation costs is complex and owners cannot be expected to replicate it. Instead they are asked to

enter the estimated value of their house and the area of the country where they live. This is combined with information on average property prices by region and house price trends to estimate the importance of depreciation in their expenditure pattern.

## Motor vehicle purchases

These are large infrequent expenditures. This is not a problem for calculating the national RPI, as annual average household expenditure estimates will always contain enough vehicle purchases to indicate their importance to the population as a whole. However, it is much more difficult to decide on the importance of changes in vehicle prices to a household or individual. An individual may wish to buy a vehicle in the future but not be interested in buying one this year. Conversely, they may expect to buy one this year but then keep it for several years. The problem has no perfect solution, certainly not with the amount of information that can be loaded into a personal inflation calculator. The solution adopted for this calculator is as follows:

- if a user reports expenditure on petrol and oil, they are taken as vehicle users and therefore potential vehicle purchasers with an interest in vehicle prices. If they do not report petrol and oil expenditure, their vehicle expenditure is set to zero
- the vehicle expenditure of potential vehicle purchasers is calculated by taking the weight for vehicle purchases used

in the RPI and increasing it to allow for the fact that not all households are vehicle users. The resulting proportion is applied to the user's total for all other expenditure to get an estimate of vehicle expenditure, that is, it is assumed that vehicle expenditure for these users is proportional to total expenditure

A fuller description of these calculations is given at the end of this article. It should be noted, however, that there is no way that they can exactly replicate the costs of individual households and that they therefore represent a further level of approximation in the calculator.

It should also be noted that the calculator holds the expenditure pattern submitted by the user fixed over the time period examined. This differs from the RPI where expenditure weights are updated annually to take account of changes in expenditure patterns between years. It is therefore impossible to enter an expenditure pattern that exactly reproduces the RPI.

Finally, it should be remembered that the calculator only combines the price changes used in calculating the RPI in a different way. It is not possible for users to enter their own estimates of the price change they have personally experienced for the expenditure groups. For example, increases in council tax vary between local authorities but the council taxes index used in the RPI is a national average calculated from the averages for England, Scotland, Wales, and Northern Ireland.

### Box 1

#### How to calculate your personal inflation rate

There are four simple stages to calculating a personal inflation rate.

- Price indices for each of the 23 categories of spending in the calculator have been produced using exactly the same price and weights data used for the RPI
- The user enters a personal pattern of expenditure on these categories in the data input screen (**Figure 1**) which replaces the relative expenditure pattern between these categories that is used for the RPI
- The calculator produces a new index for the overall price level based on the user's expenditure pattern
- The change in the new price index is used to estimate a personal inflation rate which is displayed alongside an estimate produced using a national average expenditure pattern on the personal inflation chart screen (**Figure 2**) and personal inflation table screen (**Figure 3**). Note: the estimate calculated using the national average expenditure pattern may differ from the published RPI due to rounding effects

A further screen (**Figure 4**) allows users to compare their estimated annual expenditure for the different categories.

#### To enter your expenditure pattern

1. Enter your **total** regular **monthly** expenditure (excluding housing costs, loans and taxes) in section 1.
2. Enter your monthly expenditure for each category in section 2
3. Check the residual 'other monthly expenditure' category in section 3 and replace it with your own estimate if necessary (Note: further details of what constitutes other monthly expenditure – or any other category – will appear when your mouse hovers over the appropriate title).
4. Check the running total of monthly expenditure in section 4 and amend your previous inputs as necessary
5. Enter your outstanding mortgage and the current value of your house(s), and set the region of your principal residence in section 5
6. Enter your **monthly** rent and **annual** council tax, water charges, and house insurance, also in section 5
7. Enter your spending in the **past year** on other annual expenditure categories in section 6
8. Enter your spending in the last three years for 'Furnishing and electrical goods' in section 7
9. Check the annual expenditure total in section 8 and the proportions screen and revise your estimates until you are happy with them

Figure 1  
Data input screen

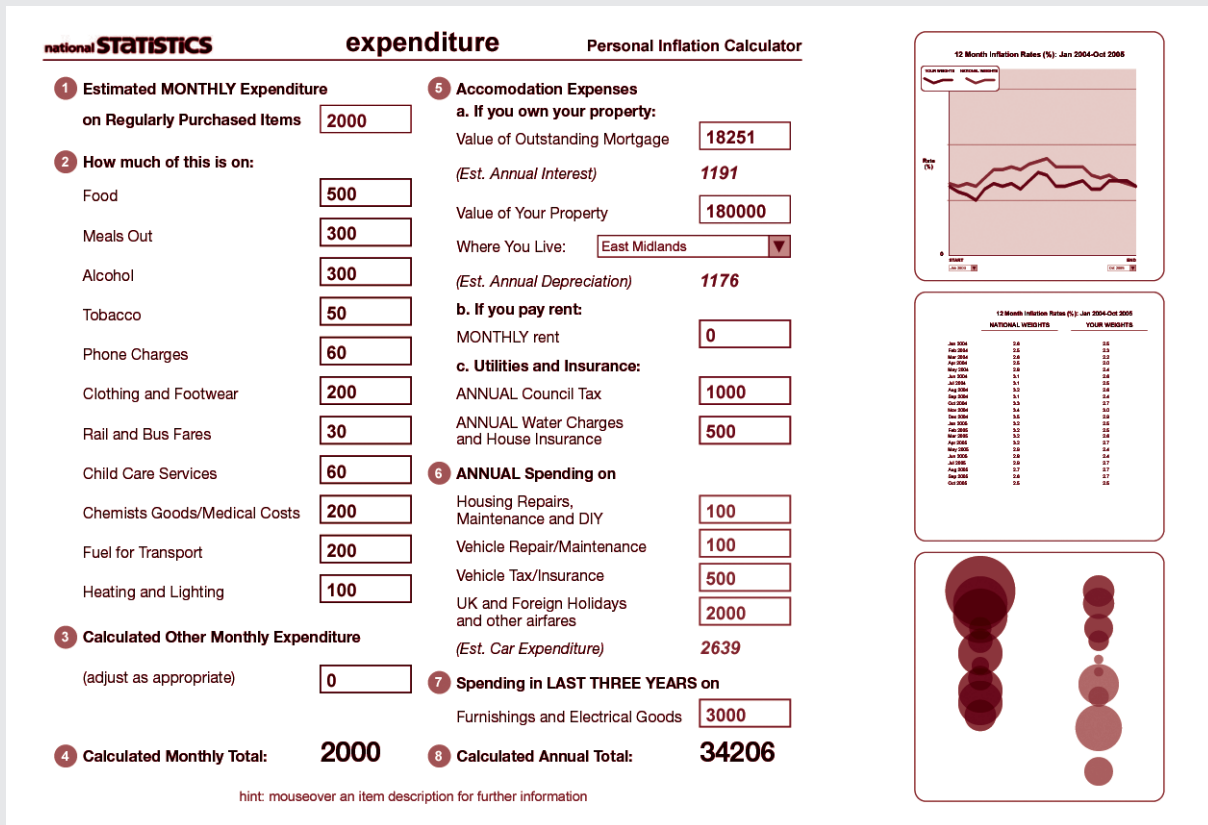


Figure 2  
Personal inflation chart

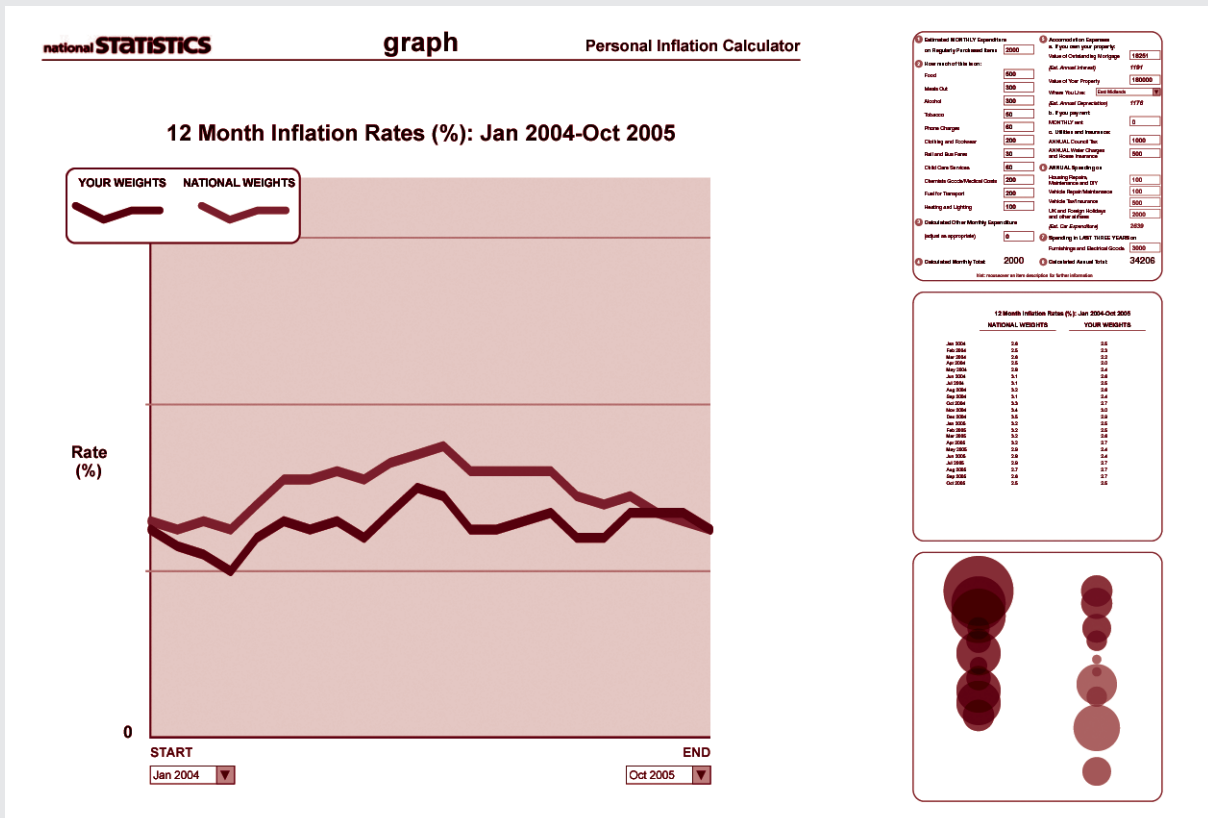


Figure 3  
Personal inflation table

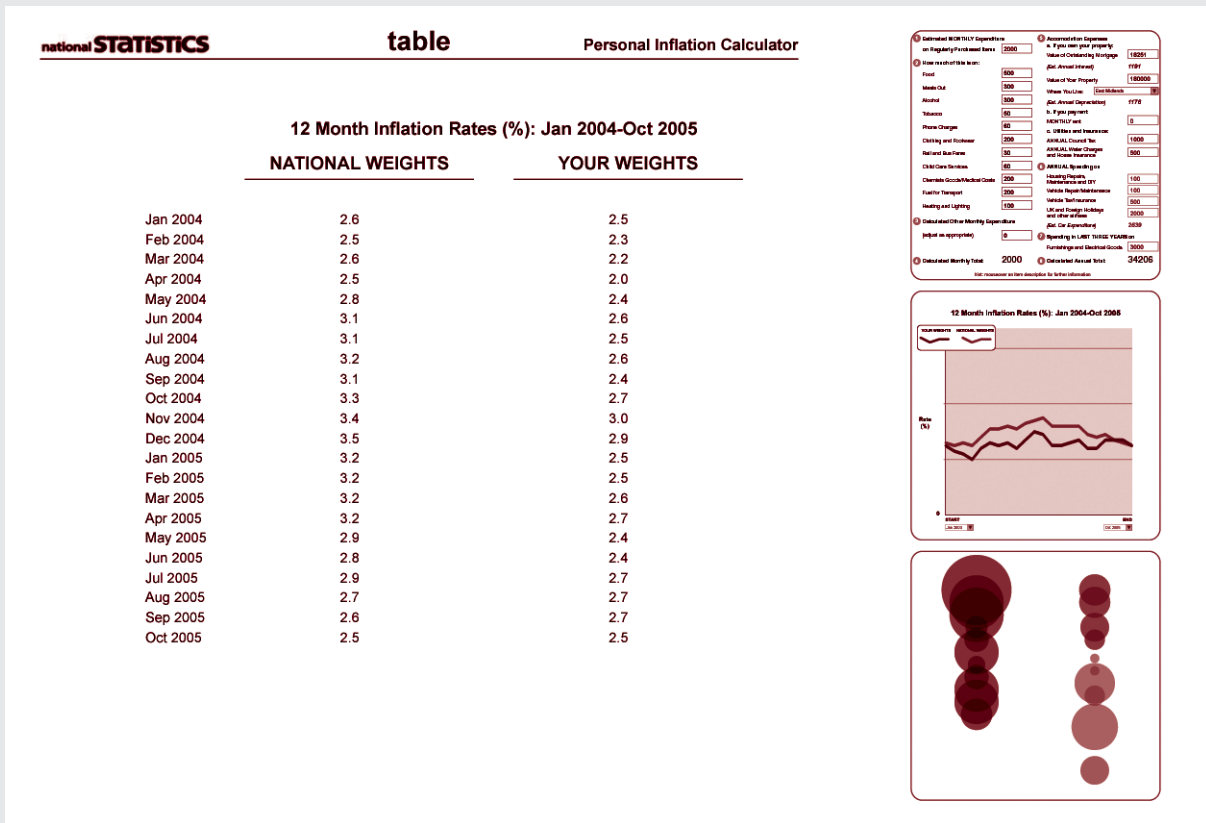
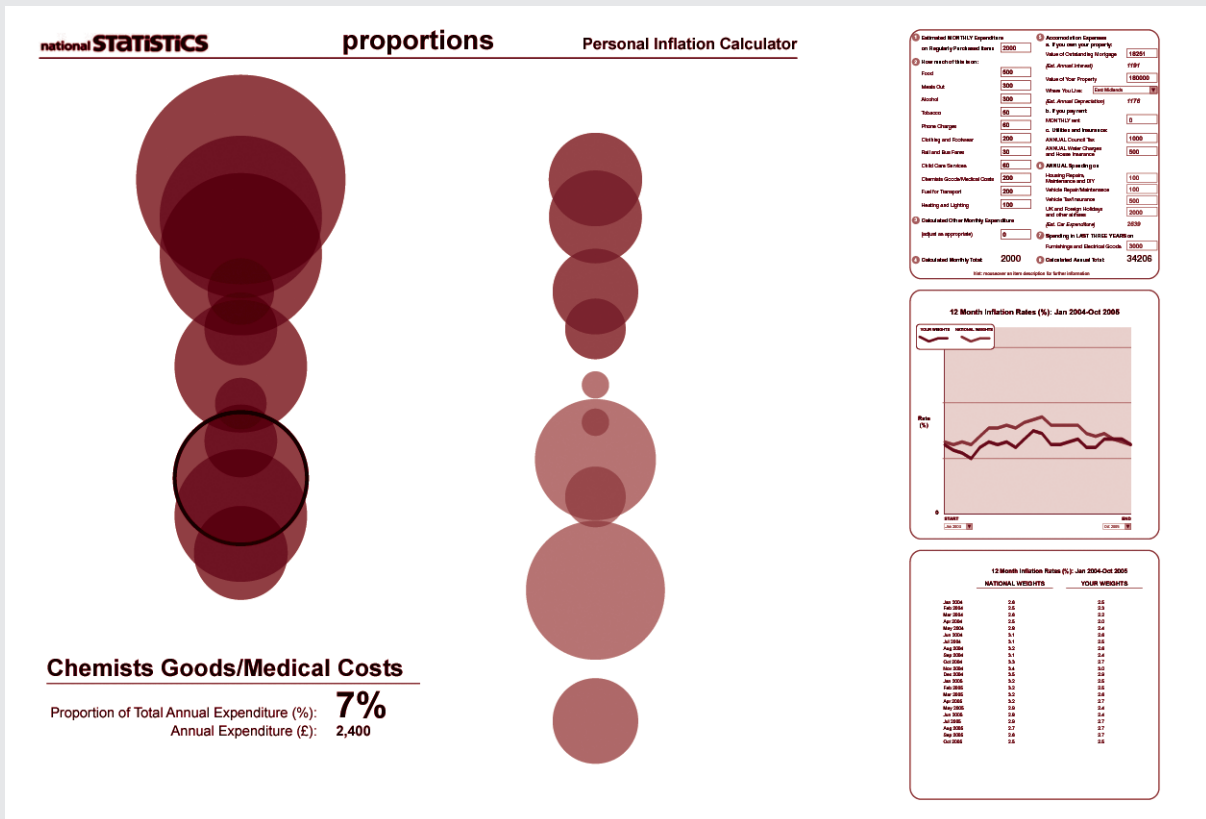


Figure 4  
Personal expenditure pattern



## Interpreting the results

The calculator can be used to illustrate the sensitivity of the published average inflation rate, as measured by the RPI, to alternative expenditure patterns, and users are encouraged to experiment with their expenditure estimates to see how these affect their inflation rates.

Figure 5, for instance, compares the national RPI inflation with that experienced by households or individuals whose expenditure pattern differs in the following ways:

- they are homeowners with no mortgage
- they are homeowners with a mortgage
- they are in rented accommodation
- they do not smoke or drink
- they travel only by public transport
- they travel only by car

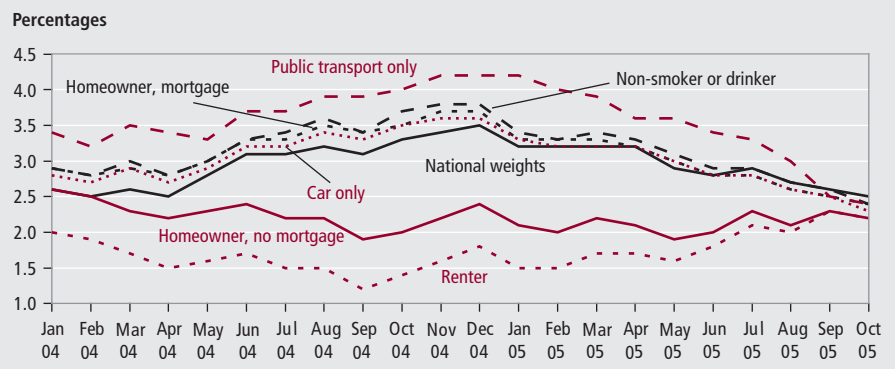
Clearly, public transport using, teetotal, mortgage payers experienced a far higher rate of inflation in this period than car owning, smoking and drinking, renters. The effects were most pronounced towards the end of 2004 when the housing indices were growing fastest. They can easily be explained by looking at the expenditure category price indices in Table 1.

The results in Figure 5 relate to the specific period shown and are provided for illustrative purposes only. The calculator on the website allows users to make such analyses for themselves using the latest data. They must, however, exercise a degree of caution in interpreting the results. In particular, users should bear in mind that the calculator only adjusts for differences between an individual's or individual households' expenditure patterns and the national pattern at a fairly broad level. As already mentioned, it is not practical to produce an index which precisely reflects an individual's or individual household's inflation experience. To reflect an individual's inflation rate would require account to be taken of the following effects, each of which may raise or lower the price change experienced by a particular individual compared with the national average:

- the pattern of expenditure within each high level expenditure group
- choices of brand and variety of product
- choices about where to shop
- shopping behaviour – shifting from brand to brand seeking out special offers or sticking with discounts

Finally, it should be noted that the results are only as good as the expenditure estimates entered by the user.

**Figure 5**  
**12-month inflation rates calculated using alternative spending patterns**



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### REFERENCES

National mortgage interest payments are estimated in the RPI by O'Donoghue (January 2007) 'Inflation – experience and perceptions' *Economic & Labour Market Review* 1(1).

### TECHNICAL NOTE

Estimating special calculations for estimating mortgage interest payments, housing depreciation and motor vehicle expenditure for the personal inflation calculator

#### Mortgage interest payments

The weight for mortgage interest payments in the RPI is calculated by taking information on average house prices, lending proportions, and repayment rates, to estimate the amount of outstanding debt per mortgage-paying household. This is then adjusted to allow for households that are not paying off a mortgage, to get an average amount of mortgage debt per household in each month and an average interest rate for each month used to calculate average weekly mortgage interest payments. These are then added to produce an annual estimate.

The estimate for the personal inflation calculator is produced by taking this annual estimate for mortgage interest payments, multiplying it by the amount of outstanding mortgage debt entered by the user, and dividing the result by the national average mortgage debt per household.

#### Housing depreciation

The weight for housing depreciation in the RPI is calculated by taking national totals for the amount for depreciation of owner-occupied housing structures estimated in the National Accounts, adjusting it to produce an index relevant to the population of households covered by the index, and dividing the result by the number of those households, to produce an annual estimate of the average value of housing depreciation.

The estimate for the personal inflation calculator is produced by taking this annual estimate for housing depreciation, multiplying it by the estimate of the value of their house as entered by the user, and dividing the result by the average value of houses in their region, as published by the Department for Communities and Local Government.

#### Motor vehicle expenditure

As explained above, motor vehicle expenditure for individuals who do not buy petrol or oil for transport is set to zero, while vehicle expenditure for those who do is calculated as a proportion of their total expenditure. In 2006, for example, 5.6 per cent of household expenditure was on buying motor vehicles and most recent estimates are that 75 per cent of households own at least one car. The weight for motor vehicle purchase costs in 2006 in the personal inflation calculator will therefore be  $5.6/0.75 = 7.5$  per cent and the estimate for vehicle expenditure will be  $(0.075/(1-0.075))$  times the total of all other expenditure.



**Table 1**  
**Inflation rates for each expenditure category, 2004**

Percentages

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mortgage interest	7.8	7.8	14.9	15.2	15.6	20.8	25.7	30.2	34.2	34.2	34.4	28.4
Rent	1.7	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.2	2.6	2.8	2.8
Food	2.6	2.2	1.9	1.3	0.8	0.5	-0.1	-0.2	-0.7	-0.5	-0.4	-0.1
Meals out (excluding alcohol)	2.9	2.8	2.9	2.7	2.7	2.7	2.5	2.5	2.4	2.7	2.8	2.7
Alcohol	2.0	1.9	2.2	2.2	1.9	1.7	2.0	1.9	1.9	1.8	1.8	1.8
Tobacco	3.2	3.1	3.2	3.7	3.6	4.0	3.6	3.6	3.7	3.8	3.8	3.9
Phone charges and post	0.2	1.0	1.5	1.9	1.8	2.1	0.0	-0.1	-1.7	-1.3	-1.1	-1.3
Clothing and footwear	-0.4	-2.3	-2.8	-2.8	-2.8	-2.6	-2.8	-3.5	-3.7	-3.1	-3.0	-3.3
Petrol and oil	1.5	0.4	-2.1	-0.5	8.2	9.1	7.6	7.3	6.8	9.8	11.1	8.6
Electricity and gas	2.8	2.6	3.6	6.4	7.2	6.9	6.9	7.3	7.7	9.3	11.1	12.7
Rail and bus fares	4.6	4.7	3.7	3.5	3.3	4.1	3.7	3.3	3.8	3.4	3.9	4.1
Child care services	4.4	4.4	4.3	4.0	4.7	4.5	4.5	4.6	4.7	4.8	4.5	4.9
Chemists goods and other medical costs	-1.0	-1.1	-1.3	-1.1	-0.5	-0.7	-0.6	-1.5	-1.2	-1.0	-0.8	-0.4
Council tax	11.9	11.9	11.9	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Other monthly expenditure	2.0	1.6	1.9	2.0	2.2	2.2	2.2	2.0	1.6	1.7	1.6	1.8
Water charges and house insurance	5.8	5.8	5.9	6.5	6.6	6.7	6.3	6.2	6.2	6.2	6.5	5.4
Housing repairs, maintenance and DIY materials	3.1	2.8	2.8	2.8	3.0	2.9	2.9	2.9	2.8	2.8	2.9	2.8
Vehicle repairs and maintenance	5.4	5.7	6.0	6.2	6.0	6.0	6.2	6.3	6.4	6.0	6.0	6.3
Vehicle tax and insurance	4.1	4.1	3.8	0.9	-1.6	-1.9	-1.2	-0.5	-0.7	-1.2	0.1	-0.1
UK and foreign holidays	-1.6	-1.2	-2.0	-2.4	-1.1	-0.1	1.5	2.4	1.7	2.1	2.8	4.8
Big ticket furniture and electrical items	-1.5	-0.5	-2.7	-0.8	-1.3	-0.2	-1.9	-1.1	-1.2	-1.2	-1.4	1.1
Housing depreciation	10.1	10.9	12.3	13.0	14.1	14.5	14.9	14.6	14.1	15.1	14.1	14.7
Car purchase	-0.5	0.0	-0.3	-1.2	-2.6	-3.5	-3.5	-3.9	-4.6	-5.6	-6.0	-6.2
RPI	2.6	2.5	2.6	2.5	2.8	3.0	3.0	3.2	3.1	3.3	3.4	3.5
Unweighted variance *100	12.1	13.0	21.8	19.5	22.7	30.2	39.3	49.2	60.8	63.6	64.3	49.0

Table 1 – continued

**Inflation rates for each expenditure category, 2005**

Percentages

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Mortgage interest	28.4	28.4	23.3	23.3	22.8	17.6	13.0	12.7	6.0	5.8
Rent	3.0	3.1	3.1	3.6	3.6	3.5	3.8	3.8	3.8	3.2
Food	0.3	0.8	1.4	0.8	1.3	2.0	1.4	1.7	1.5	1.0
Meals out (excluding alcohol)	2.7	2.7	2.7	3.1	3.1	2.9	3.0	3.0	3.2	3.2
Alcohol	1.8	2.0	1.2	1.6	1.9	2.0	2.4	2.2	2.1	2.1
Tobacco	4.7	5.2	5.1	4.9	4.9	4.3	3.4	3.3	3.2	4.0
Phone charges and post	-1.4	-2.0	-2.4	-2.6	-2.8	-2.3	-2.1	-2.1	-1.2	-1.3
Clothing and footwear	-3.5	-3.0	-2.3	-2.4	-2.6	-2.1	-2.2	-1.8	-2.3	-2.4
Petrol and oil	4.3	5.6	6.7	10.3	4.8	5.1	9.8	12.4	17.5	13.3
Electricity and gas	14.0	13.9	13.9	13.0	12.1	12.8	13.0	12.8	13.5	14.6
Rail and bus fares	5.0	4.7	4.3	3.9	3.4	3.7	4.4	4.7	4.4	5.3
Child care services	6.1	6.1	5.6	6.1	5.5	5.7	5.4	5.9	5.6	5.5
Chemists goods and other medical costs	0.5	-0.7	0.2	-0.1	0.5	1.2	1.6	1.7	0.7	1.0
Council tax	6.1	6.1	6.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Other monthly expenditure	1.9	1.8	1.6	1.8	2.0	2.0	2.0	1.7	2.3	2.3
Water charges and house insurance	4.7	4.7	4.6	7.9	7.7	7.7	7.7	7.6	7.6	7.4
Housing repairs, maintenance and DIY materials	2.7	2.8	3.0	2.9	3.2	3.1	3.6	3.1	3.0	2.8
Vehicle repairs and maintenance	6.3	6.2	5.9	6.0	5.9	6.2	5.7	6.2	5.9	6.2
Vehicle tax and insurance	-0.9	-2.9	-3.4	-1.6	-0.1	-0.5	0.5	-2.1	-1.9	-1.1
UK and foreign holidays	3.2	3.2	4.4	3.5	4.0	3.1	1.9	1.6	1.3	1.2
Big ticket furniture and electrical items	-1.7	-2.6	-0.3	-2.8	-2.7	-2.8	-0.3	-1.8	-2.3	-2.5
Housing depreciation	14.1	13.6	12.4	11.7	9.9	8.8	7.3	6.3	4.9	3.9
Car purchase	-6.9	-6.7	-6.1	-6.1	-6.0	-5.6	-5.4	-5.5	-4.5	-3.4
RPI	3.2	3.2	3.2	3.2	2.9	2.9	2.9	2.8	2.7	2.5
Unweighted variance *100	50.6	51.8	38.9	40.0	34.3	25.6	20.1	23.0	24.3	19.9